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# Career Interruptions: how do they impact pension rights?

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## Abstract:

The aim of this article is to analyze the question of career interruptions and to evaluate their impact on pension retirement for French private sector workers. Using the last French survey on households' wealth (2003-2004), we first study the career setbacks for individuals born between 1938 and 1948. We highlight the new trends in professional paths. The risk of unemployment and job flexibility has sharply risen. As a consequence, some cohorts appear to be more exposed to career interruptions. Second, we determine how pension rights for French employees are affected by different career accidents. We consider unemployment, part-time employment and inactivity periods. Our results show how, by compensating for some career accidents, the French legislation allows individuals to receive, in some cases, the same level of pension that they would have received with a smooth professional path.

JEL: E24, H55, J26

Keywords: Career interruption, Pensions, Social security.

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## Introduction

The retirement age and the standard of living of pensioners depend on a variety of individual and familial life routes: age of employment entry, children, life expectancy, unemployment, inactivity... These deviations from a continuous career are more frequent than in the past in most OECD countries and could induce a strong impact on the age of retirement and on pension benefits (COR, 2007). The aim of this article is to evaluate the effects of several cases of career breaks on the retirement pension for French workers.

The literature dealing with this subject highlights the specific situation of women. A lot of studies provide an analysis of women's career interruptions due to childbirth. Arun *et alii.* (2004) and Malo and Munoz-Bullon (2008) conduct this type of study respectively in the Australian and British cases. According to Arun *et alii.* (2004), women face income penalties because of their child-related career breaks. Malo and Munoz-Bullon (2008) show that women tend to choose lower-prestige occupations in anticipation of their career interruptions. Nakamura and Ueda (1999) investigate the determinants of career interruption following childbirth for married women in Japan. Their results show the difficulty for an educated woman to find an equivalent position when she quits her job due to childbirth. From Danish data, Gupta and Smith (2001) assess the negative impact of children on mothers' human capital accumulation. In most cases, the number of children has a negative effect on women's wages and consequently on women's pensions.

While children affect particularly women's careers, others career break determinants could be identified. The literature on the French case (Briard, 2007; Cloarec, 2000; Colin, Iéhlé, and

Mahieu, 2000; Caussat, 1996) shows that many individuals are now affected by several breaks during their professional trajectory due to unemployment, early retirement, part-time work, or inactivity.

Little research has been done to estimate the impact of these interruptions on pension benefits.

We provide an analysis of the consequences of career accidents on pension retirement in the case of French employees. Their situations are quite relevant because, firstly, the last pension reform (2003) has introduced new rules on pension rights. Secondly, in France, workers acquire pension rights in some cases of career interruptions. Indeed, French legislation allows compensation of unemployment, illness or invalidity periods in terms of duration, but the amount of pension is often calculated from a smaller reference wage. Inactivity could be also compensated by allowing insurance periods but only in the case of children's education.

This article distinguishes two sets of analysis. On the one hand, this paper investigates the recent evolution of career accidents from microdata provided by a French survey (*Enquête Patrimoine*, Insee, 2003-2004). Our results indicate that workers and pensioners are experiencing very different economic situations. These disparities are strengthened by taking into account the generation, the gender or the socio-economic group. On the other hand, this paper investigates the impact of different career accidents (unemployment, part-time work...) on pensions by considering the last pension reform's rules (2003).

The plan of the article is as follows. Section 2 provides a survey of the recent literature on the evolution of the French professional trajectories. Section 3 describes the methodology of career reconstruction and presents career path analysis. Section 4 assesses the impact of career accidents on pension. A final section concludes.

## **A brief literature review**

The recent literature on career interruptions indicates that smooth careers are not frequent. This phenomenon is particularly observed in France over the last years. Many French studies have devoted their attention to these increasing career breaks (Cloarec, 2000; Colin, Iélhé, and Mahieu, 2000; Burricand and Roth, 2000; Bommier, Magnac and Roger, 2003). Cloarec (2000) focuses on the transition time between the last working period and retirement. The author shows that today the breaks are more frequent at the end of career than in the past. Precisely, the results indicate that the time between the end of working life and the beginning of retirement increased from less than 1 year for people born before 1912, to 2.5 years for people born between 1932 and 1936.

By using the same survey, Burricand and Roth (2000) pointed towards the crucial role of French legislation, notably, the possibility for workers in the private sector to retire earlier<sup>6</sup>. However Bommier, Magnac and Roger (2003) indicate that the activity rate<sup>7</sup> remains stable for years. According to these authors, part-time work has developed over the last years for men and women. From data provided by the French Employment survey, they indicate that this phenomenon is observed more frequently for men aged from 55 to 59: between 1984 and 1997, the proportion of individuals concerned by part-time employment has tripled.

Magnac, Rapoport and Roger (2006) carry out a study on the end of careers. They examine the impact of an unemployment period, at the end of professional life, on retirement age. They take into account the effects of the last French reform in 2003 which increased the duration of contribution to receive a full pension.

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<sup>6</sup> 1992 French agreement.

<sup>7</sup> According to ILO.

Using a survey on retirees' incomes<sup>8</sup>, wages data<sup>9</sup>, data on unemployment benefits and early retirement<sup>10</sup>, they study accumulated pension rights as well as career and retirement decisions.

Their analysis shows that women retire later than men, as they experience more career interruptions.

With a duration model, they analyze the impact of unemployment on retirement decisions. According to their results, workers have a higher probability to retire at the age of 60 and 65 if they experienced an unemployment period during their career.

Colin and Mette (2003) focus their research on the impact of career setbacks on pension amounts for workers from the private sector by taking into account the 1993 French reform. They observed that both the break in the working career and the duration of working life have an impact on pension benefits. However, the evolution of the legislation shows that different generations are not submitted to the same treatment. Cohorts fully concerned by the reform of 1993 benefit from a lower replacement rate. Workers experiencing a setback such as unemployment, part-time employment or inactivity often receive a lower replacement rate. This impact can be considerable in terms of pension amounts.

In our article, we follow the same methodology used by Colin and Mette. Nevertheless, we evaluate the impact of career breaks on retirement pensions in the French case by taking into account the last pension reforms rules (2003) and more career breaks cases. Before evaluating the impact of career interruptions, we have to build the career path.

## **Methodology of career reconstruction and Career Path Analysis**

### **Methodology**

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<sup>8</sup> Data from the *Échantillon Interrégimes des Retraités* (EIR), a panel which gives information about a retiree's pension in all pension schemes (private - *régime général* – public pension schemes and complementary schemes).

<sup>9</sup> Annual wage returns data given by firms (DADS).

<sup>10</sup> Data about the unemployment benefits and pre-retirement from the *Union Nationale pour l'Emploi dans l'Industrie et le Commerce* (UNEDIC)

In order to reassemble the careers of individuals belonging to the 1938 to 1948 generations, the information given by the INSEE “Enquête Patrimoine” 2003-2004 (box 1) is very helpful to conduct an analysis by cohort as well as by gender. The role of gender is also analysed in detail. Two sub-groups are considered: 2105 men and 2068 women. This survey is particularly useful, as it encompasses a retrospective calendar of the individuals’ professional careers. Moreover, the database offers information about all pension schemes. The family characteristics are also provided (number of children)<sup>11</sup>. Starting with the initial situation of each individual, this calendar allows the reader to progressively trace the professional careers of the individual and to identify any interruptions in activity that may have taken place (unemployment and inactivity). The length of each employment can be found, even if the calendar depends on the memory of the surveyed individual. Indeed, some career setbacks may not be mentioned, either because the period was too short for the individual to remember, or because the period of unemployment or inactivity was perceived as a painful phase and therefore difficult to bring up. In other words, the survey minimises the number and the length of career setbacks.

Box 1: The INSEE *Patrimoine* Survey 2003-2004

The *Patrimoine* survey 2003-2004, including 9,692 households, was completed by INSEE between October 2003 and January 2004 and contains data on the entire metropolitan area. The objective was to evaluate the ownership and the value of different types of capital assets or liabilities, to describe the professional capital of self-employed workers to retrace the history (both conjugal and professional) behind the capital of the households (inheritance, professional activity cycle).

<sup>11</sup> The *Echantillon Interrégimes des Cotisants* (EIC) is another French survey which gives detailed information on the insured, but children and unemployed without benefits are not recorded.

It is the last survey available on this subject. It follows the survey on Financial Assets in 1992 and the *Patrimoine* survey in 1998.

The survey includes four questionnaires completed by French households and individuals. The survey covers 22,821 individuals (48% men and 52% women) aged 0 to 99 years old. All of these individuals are interviewed in the first questionnaire, the individual questionnaire. These individuals belong to the households interviewed in the second questionnaire. This second part of the survey characterizes the households' behaviours. In this "Households" part of the survey, 9 692 households are interviewed. The third questionnaire, the 'Product' part of the survey, provides us with information on the savings and financial products as well as the capital holdings of the household. Finally, the last questionnaire, 'Transmission', refers to the different transfers of capital between ancestors and descendants.

This survey particularly informs the reader of the financial and non-financial assets of the household belonging to the selected individual questioned, their revenue, their age, their social-professional category, their education/training, their marital situation, and their status (active, inactive, retired). Furthermore, the survey also includes the type (and sometimes the amount) of asset detention retained by the household (checking account, savings account, real estate, life insurance, corporate savings, *etc...*). Retirement pensions, both state and private (type and amount), are also presented.

In addition, the survey reports on the situation of households faced with unemployment, illness, and financial constraints. Individuals are asked about their career, their different



occupations over their past professional path and their unemployment, part-time employment or inactivity periods.

Another French survey, “*l’échantillon interrégime des cotisants (EIC)*”, regularly informs about the pension rights accumulated by the insured in different public pension schemes. However, we prefer the *Patrimoine* Survey because it allows us to combine the personal behaviours of the individuals with their household’s characteristics, something we cannot do using the EIC. Indeed, we cannot neglect the family phenomena when studying retirement planning.

Initially, the surveyed individuals had the choice between 15 modalities. Given the complexity and the multitude of professional careers, a regrouping of the different occupations into 6 categories was established in the following manner:

Category	Grouping
1	Study / Training / Apprenticeship / National Service
2	Public sector
3	Self-employed / entrepreneur / working in the spouse’s company
4	Unemployed (short and long term) / searching for employment
5	Retire / Early retirement / Out of business
6	Inactive / housewife / in search or not of employment

Source: Categories produced by the authors based on the *Patrimoine* Survey 2003-2004, INSEE.

For each cohort, an analysis of the individuals' careers was performed, starting with their initial occupation and followed by a decomposition of their different occupational movements.

### **Career Path Analysis**

Tables 1 and 2 present the prominent results obtained for the men and women belonging to the 1938 to 1948 generations.

The results indicate that career setbacks are becoming more frequent, particularly for people born after 1944; this is the case for women as much as for men.

As time passes by, men experiencing careers without setbacks before the age of 55 are rarer (table 1). These men represented 91% of the 1938 generation and 80% of the 1943 generation.

Increasing periods of unemployment and inactivity are also observed. More and more men are experiencing at least one period of unemployment during their career path (7% for the 1938 generation, 14% for the 1943 generation and 12% for the 1948 generation).

Inactivity periods are also more and more frequent.

No man from the 1938 and 1943 generations declared having known multiple unemployment periods, while 1.4% of the men from the 1948 generation claimed having been inactive multiple times throughout their professional career.

Table 1: Evolution of Career Setbacks for Men before they are 55 years old

Generation	1938	1943	1948
<b>% of individuals without any career setbacks at 55 years old</b>	<b>91%</b>	<b>80.4%</b>	<b>83%</b>
Among them, without changes	36%	45%	33.3%
<b>% of individuals having known at least one period of unemployment</b>	<b>7.1%</b>	<b>14.7%</b>	<b>12.2%</b>
Among them, % of individuals having known:			
-unemployment in the beginning/middle of their career	62.5%	33%	44%
-unemployment at the end of career	37.5%	67%	56%
Multiple periods of unemployment	1%	2%	3.4%
<b>% of individuals having known at least one period of inactivity</b>	<b>1.8%</b>	<b>8.8%</b>	<b>6.1%</b>
Among them, % of individuals having known:			
-inactivity in the beginning/middle of their career	50%	33.3%	55%
-inactivity at the end of career	50%	66.6%	45%
Multiple periods of inactivity	0%	0%	1.4%
<b>% of individuals having known one or more periods of unemployment and inactivity</b>	<b>0%</b>	<b>2%</b>	<b>2%</b>
<b>Number of observations</b>	<b>113</b>	<b>102</b>	<b>148</b>

Source: *Patrimoine* Survey 2003 -2004, authors' calculations.

For women, a decrease in the periods of inactivity (table 2) was observed. Fewer and fewer women experience multiple periods of inactivity during their career. As a result, women from more recent generations are more present on the labour market and therefore experience more

unemployment periods than their elders (17% for the 1943 generation, 17.5% for the 1948 generation versus 13% for the 1938 generation).

Table 2: Evolution of Career Setbacks for Women before they are 55 years old

Generation	1938	1943	1948
<b>% of individuals without any career setbacks at 55 years old</b>	<b>37.9%</b>	<b>42.2%</b>	<b>44.7%</b>
Among them, without changes	47%	65%	47%
<b>% of individuals having known at least one period of unemployment</b>	<b>12.7%</b>	<b>17.2%</b>	<b>17.4%</b>
Among them, % of individuals having known:			
-unemployment in the beginning/middle of their career	58%	25%	50%
-unemployment at the end of career	42%	75%	50%
Multiple periods of unemployment	4.2%	3.5%	3.7%
<b>% of individuals having known at least one period of inactivity</b>	<b>55.8%</b>	<b>51.7%</b>	<b>45.3%</b>
Among them, % of individuals having known:			
-inactivity in the beginning/middle of their career	55%	45%	63%
-inactivity at the end of career	45%	55%	37%
Multiple periods of inactivity	16.8%	11.2%	6.8%
<b>% of individuals having known one or more periods of unemployment and inactivity</b>	<b>6%</b>	<b>11.2%</b>	<b>8%</b>
<b>Number of observations</b>	<b>95</b>	<b>116</b>	<b>161</b>

Source: *Patrimoine* Survey 2003 -2004, authors' calculations.

The career path of a woman appears to be less and less perturbed over time. A career without any interruptions is observed for 38% of the women from the 1938 generation, 42% from the 1943 generation, and 45% from the 1948 generation.

## **Impact of career accidents on pensions**

In this part, we propose to assess the impact of fluctuations around the standard career path on the pension amount and the replacement rate, which is the simplest and most used indicator of the link between pensions and wages. To do that, we use the sample cases method (Box 2) and define sample cases of a private sector worker's career path which deviates from a full-time continuous career because of unemployment, part-time work or inactivity.

We limit our study to people who receive a basic pension from only the old age fund of the French Social Security, called CNAV (Caisse nationale d'assurance vieillesse). However, we assess the total amount of the pension determined at retirement, which includes the complementary pensions of ARRCO and AGIRC (only white collar workers).

### **Box 2: The sample cases method**

“Sample cases” or “typical cases” are often used for the assessment of public policies. They refer to units like individuals or households, whose characteristics are entirely specified for the study carried out. With regard to existing situations, which would be extracted from a population, sample cases have the advantage of being simple and not being soiled by disruptive singular attributes.

For the study of pension rights, the sample case can represent an insured individual or even a couple or a household if the analysis is extended to survivors' benefits. This sample of insured is then characterized by the attributes examined by the pension scheme for the calculation of one's pension rights: year of birth, sex, number of children, wages, *etc...*

The sample case can be typical or atypical, representative and/or illustrative. If the goal of the study is to approach a description of reality, sample cases are generally chosen as representative of the most frequent individual situations. This method collides with the problem that an average situation is not always representative of all of the individual situations which it is supposed to describe. Nevertheless, new developments based on the classification of longitudinal professional courses allow us to identify weighted typical cases from a whole population (Briard, 2007).

If the goal of the sample cases is simply to illustrate the consequences of the pension's calculation rules, the sample cases can be fictitious, only illustrative, without a narrow link to the characteristics of the population. The stylised sample cases used in this paper, partly built on statistics, can be assigned to an intermediate approach, between representative and conventional cases.

### **Definitions and sample cases**

The reference case that we consider is the path of a childless individual who begins to work at the age of 20 and stops at 60 after a continuous career without breaks or reduced activity periods. It corresponds to the norm on which the calculation of the pension paid by the Social security plan is based (see Box 3).

Five deviations around this reference case are considered<sup>12</sup>:

- a part-time job, between the ages of 30 and 44;
- an unemployment period spread over the career path: two years between the 9<sup>th</sup> and the 11<sup>th</sup> year of the working life, two years between the 19<sup>th</sup> and the 21<sup>st</sup>, one year between the 29<sup>th</sup> and the 30<sup>th</sup>;
- five years of early retirement, which can be assimilated to five years of unemployment at the end of the active life;
- an inactivity period between 35 and 39 years to raise two children, associated to “old age insurance for parents living at home” (OIPH, see Box 3);
- an inactivity period between 35 and 39 years to rise two children, but not associated to OIPH.

Except these last two sample cases supposed to be those of women with two children, cases indifferently characterize a childless woman or a man.

Our analysis also takes into account professional paths with both unemployment and inactivity. We specify three durations for the unemployment spells, 1 year, 3 years and 5 years, and two durations of inactivity, 3 years and 5 years. The place of these events on the career is the following:

- 1 year of unemployment at the age of 39 (20<sup>th</sup> year of the working life);
- 3 years of unemployment: one at the age of 29, two years at the ages of 38 and 40;
- 5 years of unemployment: same repartition as the second sample case;
- 3 years of inactivity from the age of 31 to 33 years;
- 5 years of inactivity from the ages of 31 to 35 years.

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<sup>12</sup> These five cases are those of Colin and Mette (2003). They are convergent with the observations made on the *Patrimoine* survey.

The professional paths with five years of inactivity are supposed to be followed by women with two children.

Three earnings profiles are considered:

- the flat profile of a blue collar worker 1.2 times the Guaranteed Minimum Wage (GMW);
- the growing profile of a blue collar worker which starts at 0.5 times the SS wage-ceiling (SSWC)<sup>13</sup> and finishes at 1 SSWC after 40 years of activity;
- the growing profile of a white collar worker (with contribution to AGIRC) which starts at 1 SSWC and finishes at 2 SSWC.

To simplify, we assume that the earnings progress is linear and not concave as it is generally observed. Besides, only the path with inactivity leads to a temporary stop of the wages progress. In the other cases, after the interruption of activity, the wage is the same as in the absence of interruption. For the projection, the GMW and the social security wage ceiling are supposed to grow at an annual rhythm of 1.7% until 2010 and 1.8% beyond (except inflation). The rate of payroll contributions is constant in the projections. The retirement age is supposed to remain at 65, so that the pensions are always computed at the full rate, without penalties.

#### Box 3: Calculation of the Social security pension

Social security pensions are managed by the French national old age insurance fund.

In 2008, the pension was calculated in reference to a continuous forty-year career path paid at the level of 800 hours of Guaranteed Minimum Wage (GMW) per year. Thus, a quarter of insurance is validated for every slice of annual wage at 200 hours of GMW (1,772 € on

<sup>13</sup> The Social security ceiling is the maximal wage submitted to contribution for the basic pension scheme. It is indexed on wages' growth. On January 1st, 2010, the annual ceiling was 34,620€.



January 1<sup>st</sup>, 2010). This validation does not take into account the actual duration of activity, so an individual having worked at this rate a single hour a year for forty years validates forty years of contribution.

Some non-working periods validate quarters without contributory counterpart. These so called “assimilated periods” or AP are granted for any period of 50 days of unemployment, 60 daily allowances in case of disease (also in case of childbirth or of occupational accident) and for any quarterly payment of the invalidity pension.

The Social security pension is the product of three terms, in a nutshell:

- the **annual average wage** (AAW), calculated as the average of the actualized highest annual wages (the 17 highest for the 1940-generation, the 25 highest for the 1948-generation);
- the **prorate coefficient**, which is the ratio between the insurance period validated by the individual at the Social security scheme,  $p_{ss}$ , and the statutory maximal insurance period,  $P_{ss}$  (150 quarters for the 1940-generation until 2008, 160 since);
- the **calculation rate** ( $\tau$ ), called “full rate” at its maximum of 50% and reduced by a rate  $\delta$  according to the insurance period required to reach 65 years of age or a statutory insurance period, all basic plans being considered,  $P_{AP}$  (157 quarters for the 1940-generation until 2003, 160 since).

At retirement, the basic amount of the pension benefit B is calculated as:

$$AAW \times \min\left(1, \frac{p_{ss}}{P_{ss}}\right) \times \tau$$

$$\text{with } \tau = 50\% - \delta \times \min[4 \times (65 - age), \max(0, P_{AP} - p_{AP})]$$

For people who are eligible for the full rate, this amount is compared to a minimal amount called “contributory minimum”, which is delivered on the *prorata* of the contribution period validated at the CNAV. On April 1<sup>st</sup> 2010, its complete annual amount (when  $p_{ss} \geq P_{ss}$ ) is 7,147.68€.

The complete and full pension is a reference, but is not an average. It rather constitutes an eligible maximum because an insured individual whose career path is longer cannot expect a higher pension or an earlier retirement, except if he benefits from two conditions introduced in 2003: - a “*surcote*”, which increases the pension of a rate up to 5% on the condition of pursuing a salaried activity after 60 and being eligible for the full rate; - an early retirement, starting at age 56 for the insured having long careers (with conditions of total insurance period, contribution duration and age of the beginning of activity).

Consequently, among the main differences with regard to the continuous career path, we can mention: the losses of rights due to periods of interrupted or reduced activity, and early retirements before eligibility for the full rate with an insufficient contribution duration.

Box 4: Taking the career accidents into account  
in the pension of the private sector employees

**Unemployment periods**

CNAV compensates unemployment in terms of insurance period by granting 1 quarter for 50 days of allowances. If the unemployment period isn't compensated by the unemployment fund, it is taken into account by the pension scheme within the limits of one year (continuous period or not) and, from the 2<sup>nd</sup> period, on the condition of succeeding to a compensated unemployment period.

In the complementary plans ARRCO and AGIRC, the unemployment periods allow the granting of points on the basis of the last wages: the daily wage determines the amount of unemployment allowances for ARRCO, and the three last years define allowances for AGIRC.

Consequently, periods of unemployment are quite well compensated by basic and complementary plans. However, the pension of an insured person having known unemployment periods could be lower than if he had followed a continuous career path if:

- more than one year of unemployment isn't compensated by the unemployment fund;
- the number of days of the unemployment period was lower than 50 in a calendar year;
- wages earned during the years where he was unemployed are included in the annual average wage (AAW); this is often the case if the working life is shorter than 25 years.

**Inactivity periods**

CNAV gives place to compensation of inactivity periods only in the case of parental leave: a rise of the insurance period is granted to men and women, but they can't cumulate it with the insurance period bonus of eight quarters per child, which is automatically granted to

women<sup>14</sup>. Low-income and children's age conditions (one child under 3 years of age or three children under 21), reduced activity or inactivity periods can also give the right to the pension of the "old age insurance for parents living at home" (OIPH), which consists in granting wages (based on GMW) and quarters.

These familial rights are granted without the obligation of stopping activity, and they are cumulative.

For ARRCO and AGIRC, periods of inactivity give points during parental leave if contributions are paid (with the agreement of the employer), but there is no OIPH. In general, there is no compensation for the interruption of working life due to the children's education, but a pension bonus is given to parents of three or more children.

### **Part-time and low wages**

For the CNAV, only the highest wages count for the calculation of the AAW. A quarter is validated from 200 hours of the Guaranteed Minimum Wage (GMW), that is to say four quarters for a half-time at the GMW all year long or a full-time at the GMW for six months. The important number of wages counted for the AAW penalizes the insured with short and/or intermittent career paths. Since 2004, when no quarter is validated, the corresponding year is excluded. However, if a single quarter is validated, the wage—though lower—is considered an annual wage.

ARRCO and AGIRC don't compensate periods of weak payments because the points to which the workers are entitled are in proportion to their contributions. Since 2005, people have the possibility of paying the contribution on the basis of full-time employment, but in accordance with their employers.

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<sup>14</sup> The bonus of eight quarters by child was reformed in 2010. Now, four out of eight quarters can be given the father according the decision of the parents.

## **Results and analysis**

At retirement, former employees of the private sector receive at least two pensions from the statutory plans: the pension benefit of the Social security, which is a function of the insurance period and the best wages, and the pension of the complementary plans, ARRCO and AGIRC for white collar workers, which are proportional to contributions. Yet, each of these schemes includes some compensation mechanisms so that an “accident” in the career path is generally smoothened.

### **Impact on the Social security pension paid by CNAV**

For the sample cases considered for the 1940-generation, part-time employment, unemployment and inactivity, associated or not with the OIPH, induce a variation up to 12% on the CNAV pension amount (Table 3 and Annex 1).

The impact of an accident on the insurance period is limited by various mechanisms included in the legislation (see. Box 4). The insurance period is of 160 quarters for the sample case with part-time employment because the annual wage is supposed to be always higher than 800 hours of GMW. For the case with unemployment periods, wages earned during years without unemployment are sufficient to validate four quarters a year too; moreover, the years for which the unemployment period lasts all year are completely compensated with the validation of four assimilated periods (AP). We observe the same result for the cases with an early retirement or an inactivity period associated to OIPH. The only cases in which the insurance period is less than that of the continuous career are the sample cases with inactivity and no OIPH. Of course, losses in the insurance period are less when a bonus is granted for children (16 quarters for two children). For example, the insurance period of the case with 5 years of

unemployment and 3 years of inactivity is only 148 quarters, while it is 156 for the case of 5 years of unemployment and 5 years of inactivity with two children (Annex 1b).

Whatever the sample case, the wages are superior or equal to 1.2 GMW so that the pension is not raised at the contributory minimum and the annual average wage (AAW) is effectively taken into account for the calculation of the pension. As a consequence, the incidence of a not-salaried period is variable according its timing in the career and the wages profile: if it concerns a period of weak (respectively high) earnings, AAW -and consequently the pension benefit- will be higher (respectively lesser) than for a continuous career path. Thus, a period of unemployment generally affects AAW and pension benefits less than an early retirement period, which is situated at the end of active life. For the sample cases studied, early retirement causes a decline reaching about 13% for a career path with wages growing from 0.5 to 1 SSWC, 6% for a flat profile with wages at 1.2 GMW and 5% for wages going up to the ceiling (cf. table 3a), while these values are always less in case of an unemployment period with the same duration: respectively -2.1%, -1.0% and -0.4%.

Besides, in case of an accident (part-time, unemployment or inactivity), the selection of the highest wages limits the decline of the AAW and, as a consequence, the pension. For example, for a career paid 1.2 GMW, the period of part-time employment induces a loss of 18.5% of the career average wage for the 1940-generation, but AAW being calculated on only the best wages (the 17 highest ones), its decline remains weak (in most cases 0.4%; cf. table 3 and Annex 1a). The “shock absorber” role of the calculation rule of the AAW is also particularly visible on the case mixing unemployment and inactivity breaks (Table 3b and Annex 1b). In particular, when we consider ten years without wages, that is one quarter of the total career duration, the AAW only declines 0.4% in the sample case with the higher wages (1 to 2 SSW) when the career average wage declines about 4%.

For the more recent generations, the increasing number of wages included in the AAW (enacted in 1993) leads to a decline of the ratio AAW / career average wage (Table 4). This weakens the “shock absorber” mechanism, particularly for the increasing proportion of people for whom the working life is shorter than the number of wages considered in AAW. The risk of a decrease in pensions is strengthened by the gradual increase in the insurance period required to benefit from a full pension (enacted by the 1993 and 2003 reforms) and to have a complete pension (2003 reform). As a consequence, the standard career of forty years becomes incomplete and does not represent the norm anymore. The relative losses due to a deviation from the new standard career could also increase.

### **Impact on the total amount of the pension**

The complementary plans are often qualified as more contributive than the basic plan because they do not include *implicit* redistributive mechanisms such as the AAW calculation rules. Nevertheless, they compensate some accidents like unemployment periods to a wider extent by granting as many points as the wage was maintained, while the basic plan validates quarters but does not record wages, which can have a negative impact on the annual average wage.

Evidence of redistributive mechanisms in the pension calculation rules, specifically in the basic pension, is given by decreasing replacement rates: the higher the wages during the working life, the stronger the erosion in purchasing power at retirement. In the sample cases under consideration, redistribution essentially plays between the low or the average level of earnings (1.2 GMW or 0.5 to 1 SSCW) and the high level of earnings (1 to 2 SSCW), regardless of the replacement rates computed on the last wage (see Figure 1) or on the average wage (see Table 3 and Annex 1).

The total effect of a deviation from the standard career path on the total amount of pension depends on the nature of the deviation.

The differences in wages –due to part-time employment, for example– are not smoothened in the complementary pensions. As expected, with regard to other accidents, the insured who have part-time employment periods are those who lose most in terms of complementary pension, and the higher their wages, the higher their losses: the loss reaches 12.4% for the career at 1.2 GMW, 13.1% for the career growing from 0.5 to 1 SSWC, and of 19.3 % for the career growing from 1 to 2 SSWC, with a 30% loss on the only pension served by the AGIRC.

On the contrary, in the case of unemployment, the complementary plans can better compensate the loss in pension. It appears that the loss in complementary pensions is less in the case of early retirement –assimilated to unemployment for the pension entitlements– than in the case of unemployment earlier in the career. With regard to a continuous career, the loss of total pension in the case of early retirement is less important than on only the basic plan (2.5% versus 5.9% for a career at 1.2 GMW, for example; see Table 3). On the other hand, the compensation of unemployment at younger ages by the complementary plans is not sufficient to compensate for the negative consequences of the accident on the total pension (1.9% versus 1.0% for a career in 1.2 GMW).

In no case do complementary plans compensate inactivity. Thus, the complementary pension of an insured having interrupted his activity is always lower than the pension of an insured with a continuous career. Nevertheless, for the sample cases considered in which inactivity is connected to the education of children, the familial rights entitled by the basic scheme, which can “overcompensate” this kind of interruption, perform quite well for the complete compensation of blue collar workers and reduce the decline of the pension for the white collar



workers. In particular, the familial rights can help to access to the « surcote », i.e. a bonus of the pension for each quarter validated by contribution after the full-rate age, from 60. Consequently, a woman with 160 quarters at 60 (got by 31 years of work, 5 years of OIPH, plus 4 years for two children) who works during four years from 60 to 63, can get a bonus of 12% on her basic pension if the bonus rate is of 3% per annum<sup>15</sup>.

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<sup>15</sup> The bonus rate was 3% by year until 2006. It became progressive, from 3% to 5% according the number of contributed quarters, in 2007 and 2008. From January, 1<sup>st</sup>, 2009, it is uniform and set at 5%.

## Conclusion

This article provides a measure of the impact of several career breaks on the pension retirement taking into account the last French pension reform (2003). The statutory pension schemes of the private sector employees include mechanisms to compensate career setbacks. However, the mechanisms could be estimated insufficient in the extent that the insured are not guaranteed to perceive the amounts they would have earned if they had continued to work.

In the theoretical cases studied and under the assumptions relative to these cases, a break in career could appear to be an advantage for the insured, who may perceive the same -even a higher- pension than he would with a continuous career. Nevertheless, the situation for which the pensioner receives a higher pension amount when the career is interrupted is only observed in the specific case of inactivity for children's education. This overcompensation is not necessarily inefficient, as it not only compensates for the direct consequences of the accident, but also the long run repercussions on the career. It's notably the case with childbirth because mothers obliged to temporally interrupt their activities can have difficulties recovering the same level of wages, or a similar growth in wages, when they are back on the labour market.

Besides, we have to keep in mind these evaluations are carried out on specific cases. Most of the career accidents lasted entire years –except for the case with unemployment spread over the career path. This has a relatively low impact on the annual average wage because in counterpart, the years with wages included in the pension are not amputated.

Among the various measures authorities could take to correct the negative consequences of career setbacks on pension, one measure could be to record the wages which would have been

perceived without the career break. An easier to implement and less expansive measure would be to consider the allowances perceived during the career break, as it is currently contemplated for maternity leave. However, this solution would not systematically give a higher pension in the extent that no wage can be less penalizing on the annual average wage than a low wage (including allowances) for persons who have fully worked during less than 25 years. If we lay cost issues aside, these kinds of measures could be considered for career setbacks such as unemployment or illness where the allowances are linked to contributions. In return, even if it's also technically possible that in a similar way the social income given to inactive people provide pension rights, that would raise questions about the grounds and the goals of the pension system. Finally, if we search to minimize the impact of career setbacks on retirees' revenues, the analysis scope has to be broadened in order to envision other calculation rules and to consider the social protection system as a whole.

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Table 3: Deviations from the reference career

a) Analysis on sample cases with one kind of accident – 1940-generation – retirement at 65 years

		Career average wage in €2007	AAW in €2007	Total insurance period	CNAV		CNAV + ARRCO		CNAV + ARRCO + AGIRC	
					Pension in €2007	Replacem ent rate	Pension in €2007	Replacem ent rate	Pension in €2007	Replacem ent rate
1.2 GMW (blue collar)	continuous, full-time	11 885	15 617	160	7 808	65,7%	12 753	107,3%	12 753	107,3%
	with part-time	-18,5%	-0,4%	0,0%	-0,4%	14,52	-5,1%	17,60	-5,1%	17,60
	with unemployment	-7,2%	-1,0%	0,0%	-1,0%	4,44	-1,9%	6,21	-1,9%	6,21
	with early retirement	-5,9%	-5,9%	0,0%	-5,9%	-0,01	-2,5%	3,87	-2,5%	3,87
	inactivity compensated by OIPH	-0,3%	0,0%	10,0%	0,0%	0,17	0,3%	0,58	0,3%	0,58
	<i>(with activity after 60)**</i>	-0,3%	0,0%	10,0%	12,0%	8,07	7,6%	8,48	7,6%	8,48
	inactivity not compensated	-0,3%	0,0%	-2,5%	0,0%	0,17	0,3%	0,58	0,3%	0,58
from 0.5 to 1 SSWC (blue collar)	continuous, full-time	17 721	25 157	160	12 579	71,0%	19 045	107,5%	19 045	107,5%
	with part-time	-17,0%	-2,1%	0,0%	-2,1%	12,72	-5,9%	14,45	-5,9%	14,45
	with unemployment	-6,6%	-2,1%	0,0%	-2,1%	3,43	-2,7%	4,46	-2,7%	4,46
	with early retirement	-9,3%	-12,8%	0,0%	-12,8%	-2,73	-8,7%	0,65	-8,7%	0,65
	inactivity compensated by OIPH	1,3%	0,0%	10,0%	0,0%	-0,93	0,2%	-1,20	0,2%	-1,20
	<i>(with activity after 60)**</i>	1,3%	0,0%	10,0%	12,0%	7,48	8,1%	7,21	8,1%	7,21
	inactivity not compensated	1,3%	0,0%	-2,5%	0,0%	-0,93	0,2%	-1,20	0,2%	-1,20
from 1 to 2 SSWC (white collar)	continuous, full-time	35 443	27 589	160	13 794	38,9%	21 636	61,0%	30 117	85,0%
	with part-time	-17,0%	0,0%	0,0%	0,0%	7,98	-2,7%	10,53	-10,4%	6,72
	with unemployment	-6,6%	-0,4%	0,0%	-0,4%	2,58	-0,8%	3,79	-4,3%	2,15
	with early retirement	-9,3%	-4,8%	0,0%	-4,8%	1,92	-2,4%	4,59	-6,2%	2,85
	inactivity compensated by OIPH	1,3%	0,0%	10,0%	0,0%	-0,51	-0,2%	-0,94	-2,8%	-3,50
	<i>(with activity after 60)**</i>	1,3%	0,0%	10,0%	12,0%	4,10	7,4%	3,67	2,6%	1,11
	inactivity not compensated	1,3%	0,0%	-2,5%	0,0%	-0,51	-0,2%	-0,94	-2,8%	-3,50

SSWC: Social security wage ceiling, \* Gross replacement rate of the career average wage (deviation in points of percentage)

\*\* Case with a labor withdrawal at 56, then a re-entry from 60 to 63. The insurance period is unchanged, but the insured is eligible to a bonus of her basic pension. For the 1940-generation, the case has an illustrative role, because the “surcote” was set up in 2004 and only the quarters got from this date are taken into account. Moreover, here we suppose the delay of the working period from 56-59 to 60-63 has no impact on the pension without bonus (actualization coefficients of wages and points prices are the same).

Amounts in euros 2007, the career annual average wage of an insured born in 1940 who has followed a continuous career from 20 to 59 years of age, paid at full-time at 1.2 GMW, is of 11,885 €. At his retirement at 65, this insured can expect from the CNAV a pension of 7,808 €, his replacement rate is then of 65.7% (7,808 / 11,885). If this insured had had 15 years of part-time from 30 to 44 years, his pension would have been less of 0.4% and his replacement rate higher of 14.52 points.

*b) Analysis on sample cases with two kinds of accidents – 1940-generation – retirement at 65 years*

				CNAV		CNAV + ARRCO		CNAV + ARRCO + AGIRC		
				Pension in €2007	Replac- ement rate	Pension in €2007	Replac- ement rate	Pension in €2007	Replac- ement rate	
				Career average wage in €2007	AAW in €2007	Total insurance period (quarters)				
1.2 GMW (blue collar)	continuous, full-time	11 885	15 617	160	7 808	65,7%	12 753	107,3%	12 753	107,3%
	1 y. unempl., 3 y. inact.	1,7%	0,0%	-7,5%	-1,3%	-1,99	-2,1%	-4,10	-2,1%	-4,10
	1 y. unempl., 5 y. inact. + 2 child.	2,3%	0,0%	-2,5%	0,0%	-1,50	1,1%	-1,33	1,1%	-1,33
	3 y. unempl., 3 y. inact.	-0,3%	0,0%	-7,5%	-1,3%	-0,65	-2,4%	-2,18	-2,4%	-2,18
	3 y. unempl., 5 y. inact. + 2 child.	0,1%	0,0%	-2,5%	0,0%	-0,09	0,8%	0,76	0,8%	0,76
	5 y. unempl., 3 y. inact.	-5,9%	-1,0%	-7,5%	-2,3%	2,49	-4,3%	1,78	-4,3%	1,78
	5 y. unempl., 5 y. inact.+ 2 child.	-5,7%	-1,0%	-2,5%	-1,0%	3,30	-1,2%	5,10	-1,2%	5,10
from 0.5 to 1 SSWC (blue collar)	continuous, full-time	17 721	25 157	160	12 579	71,0%	19 045	107,5%	19 045	107,5%
	1 y. unempl., 3 y. inact.	2,4%	0,0%	-7,5%	-1,3%	-2,57	-2,2%	-4,77	-2,2%	-4,77
	1 y. unempl., 5 y. inact. + 2 child.	3,6%	0,0%	-2,5%	0,0%	-2,47	0,8%	-2,94	0,8%	-2,94
	3 y. unempl., 3 y. inact.	0,7%	0,0%	-7,5%	-1,3%	-1,46	-2,4%	-3,38	-2,4%	-3,38
	3 y. unempl., 5 y. inact. + 2 child.	1,9%	0,0%	-2,5%	0,0%	-1,33	0,5%	-1,47	0,5%	-1,47
	5 y. unempl., 3 y. inact.	-4,8%	-2,1%	-7,5%	-3,4%	1,03	-5,1%	-0,37	-5,1%	-0,37
	5 y. unempl., 5 y. inact.+ 2 child.	-4,0%	-2,1%	-2,5%	-2,1%	1,37	-2,4%	1,82	-2,4%	1,82
from 1 to 2 SSWC (white collar)	continuous, full-time	35 443	27 589	160	13 794	38,9%	21 636	61,0%	30 117	85,0%
	1 y. unempl., 3 y. inact.	2,4%	0,0%	-7,5%	-1,3%	-1,41	-2,7%	-3,00	-2,9%	-4,41
	1 y. unempl., 5 y. inact. + 2 child.	3,6%	0,0%	-2,5%	0,0%	-1,35	0,2%	-2,02	-1,9%	-4,50
	3 y. unempl., 3 y. inact.	0,7%	0,0%	-7,5%	-1,3%	-0,80	-2,7%	-2,11	-3,9%	-3,91
	3 y. unempl., 5 y. inact. + 2 child.	1,9%	0,0%	-2,5%	0,0%	-0,73	0,1%	-1,09	-2,8%	-3,95
	5 y. unempl., 3 y. inact.	-4,8%	-0,4%	-7,5%	-1,8%	1,25	-3,7%	0,73	-7,4%	-2,33
	5 y. unempl., 5 y. inact.+ 2 child.	-4,0%	-0,4%	-2,5%	-0,4%	1,44	-0,9%	1,95	-6,4%	-2,15

SSWC: Social security wage ceiling, \* Gross replacement rate of the career average wage (deviation in points of percentage)

Table 4: Ratio AAW / gross annual wage average (retirement at 65)

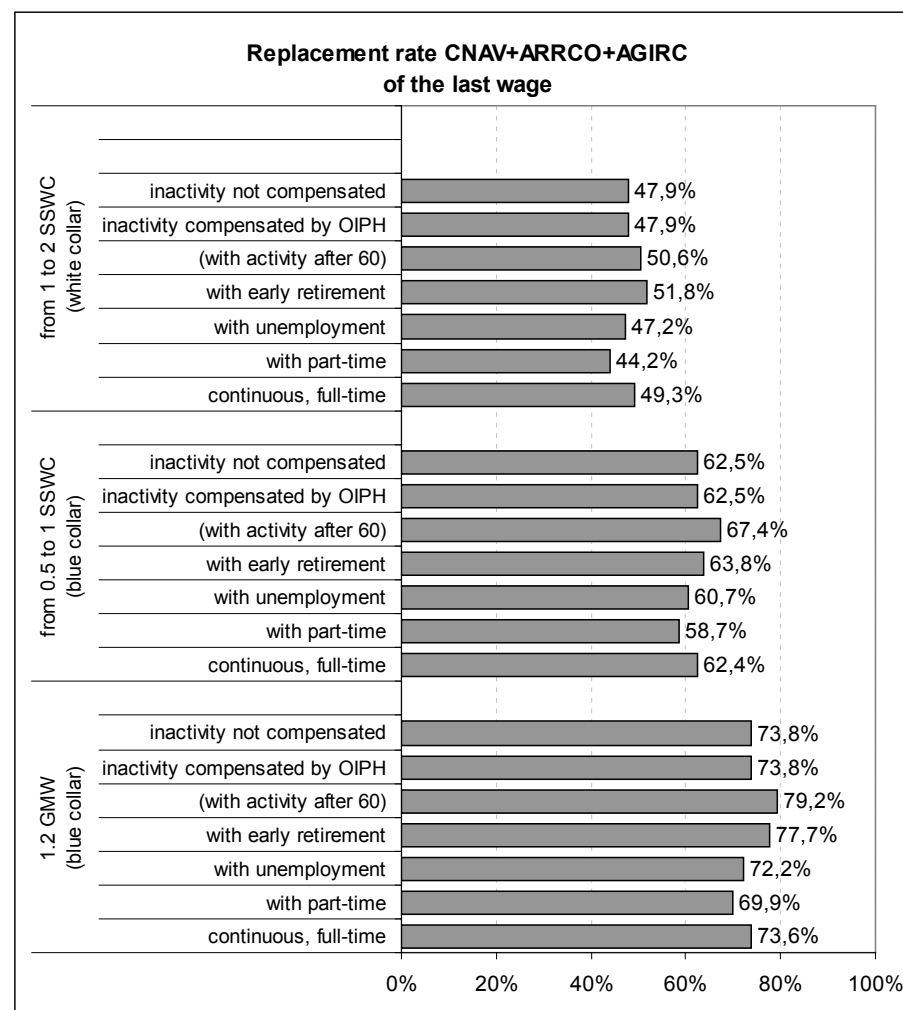
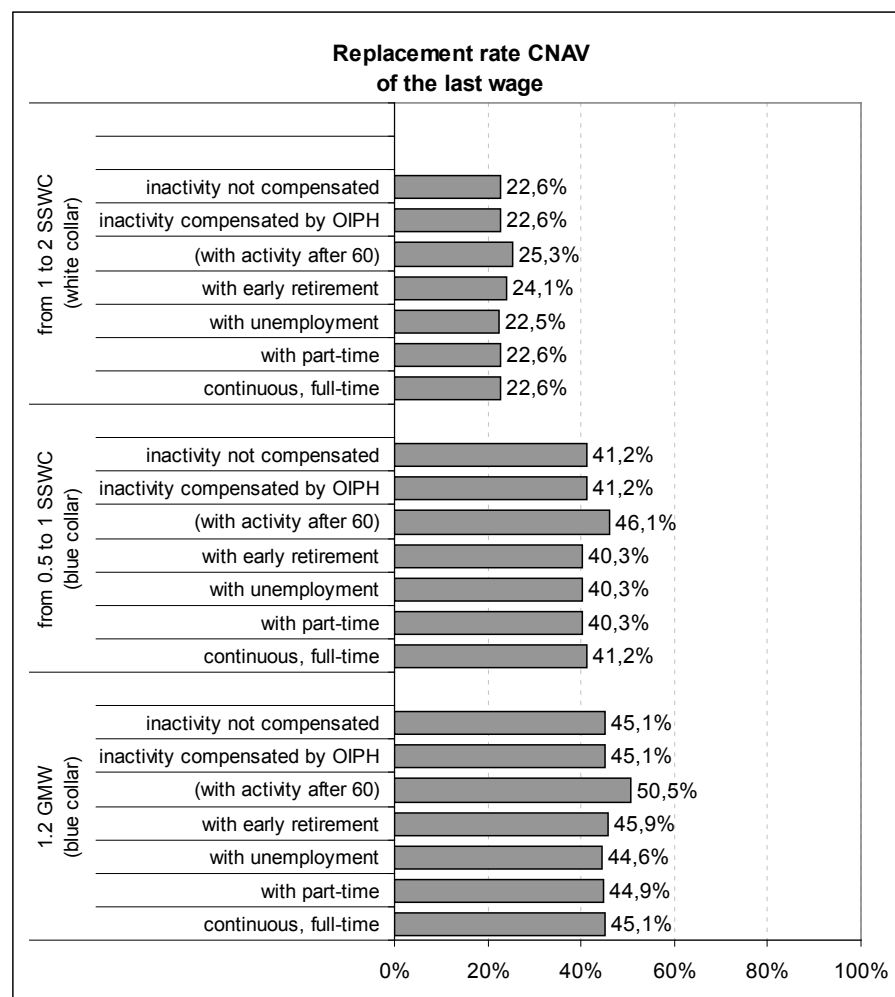
Career at 1.2 GMW (blue collar)	Generations				
	1940	1950	1960	1970	1980
Continuous at full-time	1.31	1.13	1.11	1.13	1.13
with part-time	1.60	1.29	1.26	1.26	1.26
with unemployment	1.40	1.19	1.16	1.17	1.26
with early retirement	1.31	1.10	1.07	1.08	1.09
inactivity compensated by OIPH	1.32	1.12	1.09	1.10	1.10
inactivity not compensated	1.32	1.12	1.09	1.10	1.10

*For an insured born in 1940, the annual average wage (AAW) considered for the calculation of his pension is based on his 17 highest actualized wages. Because of the limitation to the best wage, if the insured has followed a continuous full-time carrier, with wages at 1.2 GMW, the AAW is also higher than 31% of the gross annual wage average. From the 1948 generation, the number of wages considered in the AAW goes to 25, which leads to a decrease of the ratio AAW / gross annual wage average. The variations between the successive generations submitted to the same rules of calculation (here the 1950, 1960, 1970, 1980 generations) are only due to different wage sequences.*



Figure 1: Gross replacement rate of the last wage (retirement at 65 years)

\* Analysis on sample cases with only one kind of accident – 1940-generation



\* For the case with early retirement, the last wage is the wage earned at 54 years and not at 59.

## Annex 1: Evaluation on sample cases for the 1940-generation

*a) with only one kind of accident: part-time, unemployment, early retirement, inactivity with children*

		Career average wage in €2007	AAW in €2007	Total insurance period	CNAV		CNAV + ARRCO		CNAV + ARRCO + AGIRC	
					Pension in €2007	Replacem ent rate	Pension in €2007	Replacem ent rate	Pension in €2007	Replacem ent rate
1.2 GMW (blue collar)	continuous, full-time	11 885	15 617	160	7 808	65,7%	12 753	107,3%	12 753	107,3%
	with part-time	9 690	15 547	160	7 773	80,2%	12 102	124,9%	12 102	124,9%
	with unemployment	11 024	15 464	160	7 732	70,1%	12 514	113,5%	12 514	113,5%
	with early retirement	11 186	14 695	160	7 348	65,7%	12 436	111,2%	12 436	111,2%
	inactivity compensated by OIPH	11 855	15 617	176	7 808	65,9%	12 789	107,9%	12 789	107,9%
	<i>(with activity after 60)**</i>				8 745	73,8%	13 726	115,8%	13 726	115,8%
	inactivity not compensated	11 855	15 617	156	7 808	65,9%	12 789	107,9%	12 789	107,9%
from 0.5 to 1 SSWC (blue collar)	continuous, full-time	17 721	25 157	160	12 579	71,0%	19 045	107,5%	19 045	107,5%
	with part-time	14 707	24 618	160	12 309	83,7%	17 930	121,9%	17 930	121,9%
	with unemployment	16 547	24 624	160	12 312	74,4%	18 521	111,9%	18 521	111,9%
	with early retirement	16 078	21 947	160	10 974	68,3%	17 384	108,1%	17 384	108,1%
	inactivity compensated by OIPH	17 956	25 157	176	12 579	70,1%	19 082	106,3%	19 082	106,3%
	<i>(with activity after 60)**</i>				14 088	78,5%	20 592	114,7%	20 592	114,7%
	inactivity not compensated	17 956	25 157	156	12 579	70,1%	19 082	106,3%	19 082	106,3%
from 1 to 2 SSWC (white collar)	continuous, full-time	35 443	27 589	160	13 794	38,9%	21 636	61,0%	30 117	85,0%
	with part-time	29 413	27 589	160	13 794	46,9%	21 051	71,6%	26 971	91,7%
	with unemployment	33 094	27 469	160	13 734	41,5%	21 457	64,8%	28 833	87,1%
	with early retirement	32 157	26 267	160	13 133	40,8%	21 107	65,6%	28 240	87,8%
	inactivity compensated by OIPH	35 912	27 589	176	13 794	38,4%	21 586	60,1%	29 258	81,5%
	<i>(with activity after 60)**</i>				15 450	43,0%	23 242	64,7%	30 914	86,1%
	inactivity not compensated	35 912	27 589	156	13 794	38,4%	21 586	60,1%	29 258	81,5%

*Sample cases with inactivity are supposed to be those of women with two children.*

*b) with two kinds of accidents: unemployment and inactivity*

		Career average wage in €2007	AAW in €2007	Total insurance period	CNAV		CNAV + ARRCO		CNAV + ARRCO + AGIRC	
					Pension in €2007	Replac- ement rate	Pension in €2007	Replac- ement rate	Pension in €2007	Replac- ement rate
1.2 GMW (blue collar)	continuous, full-time	11 885	15 617	160	7 808	65,7%	12 753	107,3%	12 753	107,3%
	1 y. unempl., 3 y. inact.	12 092	15 617	148	7 704	63,7%	12 480	103,2%	12 480	103,2%
	1 y. unempl., 5 y. inact. + 2 child.	12 162	15 617	156	7 808	64,2%	12 889	106,0%	12 889	106,0%
	3 y. unempl., 3 y. inact.	11 844	15 617	148	7 704	65,0%	12 451	105,1%	12 451	105,1%
	3 y. unempl., 5 y. inact. + 2 child.	11 901	15 617	156	7 808	65,6%	12 860	108,1%	12 860	108,1%
	5 y. unempl., 3 y. inact.	11 189	15 464	148	7 629	68,2%	12 205	109,1%	12 205	109,1%
	5 y. unempl., 5 y. inact.+ 2 child.	11 206	15 464	156	7 732	69,0%	12 596	112,4%	12 596	112,4%
from 0.5 to 1 SSWC (blue collar)	continuous, full-time	17 721	25 157	160	12 579	71,0%	19 045	107,5%	19 045	107,5%
	1 y. unempl., 3 y. inact.	18 141	25 157	148	12 411	68,4%	18 630	102,7%	18 630	102,7%
	1 y. unempl., 5 y. inact. + 2 child.	18 359	25 157	156	12 579	68,5%	19 191	104,5%	19 191	104,5%
	3 y. unempl., 3 y. inact.	17 853	25 157	148	12 411	69,5%	18 583	104,1%	18 583	104,1%
	3 y. unempl., 5 y. inact. + 2 child.	18 061	25 157	156	12 579	69,6%	19 143	106,0%	19 143	106,0%
	5 y. unempl., 3 y. inact.	16 869	24 624	148	12 148	72,0%	18 067	107,1%	18 067	107,1%
	5 y. unempl., 5 y. inact.+ 2 child.	17 016	24 624	156	12 312	72,4%	18 597	109,3%	18 597	109,3%
from 1 to 2 SSWC (white collar)	continuous, full-time	35 443	27 589	160	13 794	38,9%	21 636	61,0%	30 117	85,0%
	1 y. unempl., 3 y. inact.	36 282	27 589	148	13 610	37,5%	21 062	58,0%	29 232	80,6%
	1 y. unempl., 5 y. inact. + 2 child.	36 718	27 589	156	13 794	37,6%	21 673	59,0%	29 548	80,5%
	3 y. unempl., 3 y. inact.	35 707	27 589	148	13 610	38,1%	21 044	58,9%	28 946	81,1%
	3 y. unempl., 5 y. inact. + 2 child.	36 121	27 589	156	13 794	38,2%	21 657	60,0%	29 268	81,0%
	5 y. unempl., 3 y. inact.	33 738	27 469	148	13 551	40,2%	20 842	61,8%	27 882	82,6%
	5 y. unempl., 5 y. inact.+ 2 child.	34 033	27 469	156	13 734	40,4%	21 440	63,0%	28 186	82,8%